In the Claims

Please cancel claims 36 and 37. This listing of claims replaces all prior versions.

1. (previously presented): A duplex portable handset speakerphone, comprising:

a microprocessor;

a hands-free receive register coupled to the microprocessor;

a hands-free transmit register coupled to the microprocessor;

a memory circuit having an algorithm executable by the microprocessor for operating the speakerphone;

a first analog-to-digital converter coupled to the hands-free receive register;

a second analog-to-digital converter coupled to the hands-free transmit register;

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a first programmable digital attenuator in a speech path and coupled to the microprocessor and to a speaker;

a second programmable digital attenuator in another speech path and coupled to the microprocessor and to a microphone;

wherein the microprocessor alternately receives speech signals in the respective speech paths and determines peak volume levels in both speech paths and adjusts gain levels in the speech paths in response to the peak volume levels.

2. (previously presented): A speakerphone system comprising:

a full duplex portable handset including

an integrated circuit controller chip having a microprocessor, an embedded hands-free receive register coupled to the microprocessor, an embedded hands-free transmit register coupled to the microprocessor, a pre-amplifier coupled to the microprocessor, and a codec having first and second programmable digital attenuators, the first programmable digital attenuator coupled to the microprocessor, and the second programmable digital attenuator coupled to the microprocessor, to the embedded hands-free transmit register, and to the pre-amplifier; wherein the microprocessor alternately receives speech signals in the respective speech paths and determines peak volume levels in both speech paths

and adjusts the programmable digital attenuators in response to the peak volume levels and duplex communication is achieved.

3. (cancelled)

4. (original): The speakerphone system of claim 2, further including a base station comprising:

an integrated circuit controller chip comprising a codec;
a telephone line interface; and
a radio frequency interface.

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5-6. (cancelled)

Cont

7. (previously presented): A method of operating a duplex speakerphone by a microprocessor in a portable handset, without digital signal processing, the handset further including a ROM containing a stored operation algorithm for directing the microprocessor, hands-free transmit and receive registers, a microphone, a speaker, a first-speech path between the microphone and a radio frequency interface, and a second speech path between the speaker and the radio frequency interface, the method comprising the steps of:

a. directing the reading of the hands-free registers, and determining the peak volume levels of both speech paths; and
b. digitally adjusting the microphone and speaker gains in relation to the peak volume levels.

8. (previously presented): The method of claim 7, wherein the stored operation algorithm uses software timers and peak detection.

9. (original): The method of claim 8, wherein a software time generates a hardware interrupt to the microprocessor on every speech frame so that one of the hands-free registers can be read by a software peak detector.

10-23. (cancelled)

24. (previously presented): A speakerphone, comprising:

a base unit; and

a portable handset communicatively coupled to the base unit via a wireless channel, including

a microphone;

a speaker;

a first speech path to the speaker;

a second speech path to the microphone;

a first programmable digital level-adjustor adapted to be controlled to provide a gain adjustment along the first speech path;

a second programmable digital level-adjustor adapted to be controlled to provide a gain adjustment along the second speech path;

a logic decision circuit, coupled to the first and second programmable digital level-adjustors, adapted to alternately receive speech signals in the respective speech paths and determine regularly the respective peak amplitudes of signals in the first and second speech paths, and, in response, controlling the gains of the respective first and second speech paths during full duplex operation by controlling the first and second programmable digital level-adjustors.

F1 cont

25. (previously presented): A speakerphone arrangement, according to claim 24, wherein the logic decision circuit is a microprocessor circuit.

26. (previously presented): A speakerphone arrangement, according to claim 24, wherein the logic decision circuit is configured and arranged to dynamically regulate the balance of the speech paths during full duplex communication.

27. (previously presented): A speakerphone arrangement, according to claim 24, wherein the logic decision circuit is further adapted to implement automatic gain control and thereby regulate gain proportions along at least one of the two speech paths in a full duplex state.

28. (previously presented): A speakerphone arrangement, according to claim 24, wherein the logic decision circuit is further adapted to implement automatic gain control and thereby regulate gain proportions along both speech paths in a full duplex state.

29. (previously presented): A speakerphone arrangement, according to claim 24, wherein the logic decision circuit is further adapted to operate in a plurality of full duplex substates, each substate defining a different relationship between respective gains of the first and second speech paths.

F1 Cont

30. (previously presented): A speakerphone arrangement, according to claim 29, wherein the substates include a first unbalanced gain relationship used in response to the speech volume of the first speech path that is less than the speech volume of the second speech path, and a second unbalanced gain relationship used in response to the speech volume of the first speech path that is greater than the speech volume of the second speech path.

31. (previously presented): A speakerphone arrangement, according to claim 29, wherein the substates include a balanced gain relationship, first unbalanced gain relationship used in response to the speech volume of the first speech path that is less than the speech volume of the second speech path, and a second unbalanced gain relationship used in response to the speech volume of the first speech path that is greater than the speech volume of the second speech path.

32. (previously presented): A speakerphone arrangement, according to claim 24, wherein the logic decision circuit is further adapted to implement automatic gain control using hysteresis and thereby regulate gain proportions along both speech paths a full duplex state.

33. (previously presented): A speakerphone arrangement, according to claim 24, wherein the logic decision circuit is further adapted to operate in a plurality of full duplex substates, each substate defining a different relationship between respective gains of the first and second speech paths, one of the substates include a balanced gain relationship,

another substate including a first unbalanced gain relationship used in response to the speech volume of the first speech path that is less than the speech volume of the second speech path, and another substate including a second unbalanced gain relationship used in response to the speech volume of the first speech path that is greater than the speech volume of the second speech path.

34. (previously presented): A speakerphone arrangement, according to claim 24, wherein the logic decision circuit is further adapted to operate in a plurality of full duplex substates, with the logic decision circuit transitioning between substates in response to: the volume levels in the first and second speech paths, and the current substate.

F1 cont

35. (previously presented): A speakerphone arrangement including a microphone and a speaker, comprising:

a first speech path to the speaker;

a second speech path to the microphone;

a first level-adjustment means adapted to be controlled to adjust the volume along the first speech path;

a second level-adjustment means adapted to be controlled to adjust the volume along the second speech path;

means for alternately receiving speech signals in the respective speech paths and determining regularly the respective peak amplitudes of signals in the first and second speech paths, and in response controlling the gains of the respective first and second speech paths during full duplex operation by controlling the first and second level-adjustment means.

36. (cancelled)

37. (cancelled)